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UNITED STATES DEPARTMENT OF AGRICULTURE

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LOGAN WALLER PAGE, Director.

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THE RESULTS OF PHYSICAL TESTS OF ROAD-BUILDING ROCK IN 1916, INCLUDING ALL COMPRESSION TESTS.

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INTRODUCTION.

This bulletin should be considered as a supplement to United States Department of Agriculture Bulletin 370, which gives the results of the more common physical tests of some 3,650 road-building rock examined by the Office of Public Roads and Rural Engineering to January 1, 1916. The office tested 396 samples of rock in 1916, the results of which tests are given in Table I, the rocks being classified according to their location. It should be noted that in a number of cases, in addition to other tests, the crushing strength of the rock also is given. This test is not made ordinarily when examining rock to determine its suitability for use in various types of broken-stone roads. The test is employed often, however, when considering a rock for use in the manufacture of paving block, and as many requests for records of the crushing strength of various rocks have been received in the past year, it has been thought advisable to give in Table II a complete record of all of the crushing-strength tests made by the office up to January 1, 1917. Following is a brief description of this test, as made by the office.

CRUSHING STRENGTH OR COMPRESSION TEST.

The compression test is made upon a cylindrical test specimen 2 inches in diameter and 2 inches high. Both ends of the specimen, which have been sawed at right angles to the axis of the cylinder,

and properly faced, are bedded in plaster of Paris. The cylinder then is crushed in a 200,000-pound universal testing machine. A small 2-inch spherical bearing block is placed between the moving head of the machine and the upper surface of the specimen. The average of at least two determinations is reported as the crushing strength, calculated in pounds per square inch. Crushing strength tests are made upon samples of road-building rock only when especially requested. Of a total of 282 compression tests made up to January 1, 1917, Table II shows that 97 were made on granites, 13 on gneisses, 78 on limestones, 42 on dolomites, 28 on sandstones, and 24 on various other types of material.

The percentage variation in the strength of the 110 granites and gneisses and the 120 limestones and dolomites is shown graphically in figure 1. In this chart the per cent of total samples tested having various values for crushing strength are plotted as indicated. For instance, the chart shows that 10 per cent of all granites and gneisses tested show a crushing strength of 20,000 pounds per square inch. Likewise, by summing up all the per cents to the left of the 20,000-pound line we find that 48 per cent of all samples of granite and gneiss tested have a crushing strength of less than 20,000 pounds per square inch, which shows that the average crushing strength of this type of material lies between 19,000 and 20,000 pounds per square inch. Likewise, the average crushing strength of the limestones and dolomites lies between 18,000 and 19,000 pounds per square inch.

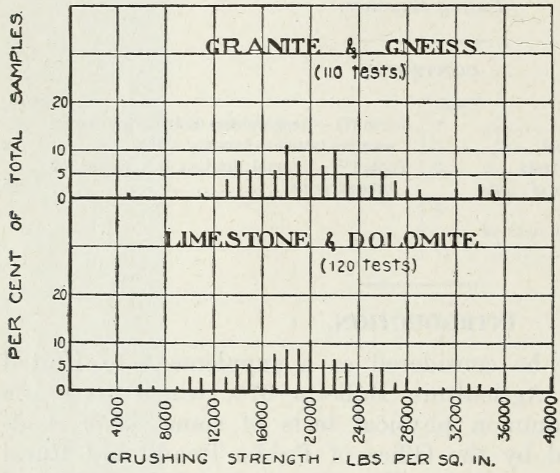

FIG. 1.—Variations in the crushing strength of rock.

INTERPRETATION OF RESULTS OF PHYSICAL TESTS.

A discussion of the interpretation of the results of physical tests was given in Bulletin 370, to which reference has been made. Since the publication of that bulletin, however, a table of general limiting test values for broken stone for various types of road construction has been adopted by the office and printed on the back of its form for reporting tests. For general reference these limiting values, together with comments upon limits shown, are given in Table IV.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917.*

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
ALABAMA.											
10138	Bridgeport	Jackson	Oolitic limestone	(1)	168	0.21	4.4	9.1	15.7	5	41
9985	Birmingham	Jefferson	Limestone	(1)	168	.55	5.0	8.0	15.3	6	40
ARKANSAS.											
9828	Lamar	Johnson	Feldspathic sandstone	21,980	159	1.98	(1)	(1)	18.7	13	17
9838	Fort Smith	Sebastian	Sandstone	(1)	150	5.00	6.5	6.2	15.3	6	25
10486	Gillham	Sevier	Feldspathic quartzite	(1)	164	.42	2.3	17.4	19.0	32	(1)
COLORADO.											
9821	Lyons (near)	Boulder	Argillaceous limestone	(1)	162	2.98	4.9	8.2	15.3	7	162
9822	Lyons	do	Sandstone	(1)	156	1.73	3.4	11.8	18.3	11	36
9823	Lyons (near)	do	do	(1)	156	1.37	2.9	13.8	16.0	14	13
11168	Denver	Jefferson	Augite andesite	(1)	169	1.27	2.7	14.8	15.3	17	98
11169	do	Denver	Smelter slag	(1)	216	.65	7.6	5.3	(1)	(1)	6
11170	do	do	do	(1)	217	.50	5.1	7.8	(1)	(1)	7
11171	do	do	do	(1)	217	.86	4.6	8.7	17.3	15	4
CONNECTICUT.											
9944	Plainville	Hartford	Diabase	(1)	184	1.14	2.0	20.0	19.0	23	102
11151	East Haven	New Haven	Altered basalt	(1)	169	.63	3.7	10.8	17.3	10	72
11067	Waterford	New London	Granite	21,840	162	1.74	(1)	(1)	18.7	13	(1)
11068	do	do	Biotite granite	23,850	162	.78	(1)	(1)	18.7	8	(1)
11069	do	do	do	22,170	164	.71	(1)	(1)	18.7	14	(1)
9791	Oneco	Windham	do	16,635	(1)	(1)	(1)	(1)	18.3	8	(1)
11098	do	do	do	23,290	164	.55	(1)	(1)	18.7	6	(1)
11099	do	do	Gneissoid granite	20,200	163	.67	(1)	(1)	18.7	6	(1)
11148	(2)	do	do	20,825	163	.44	4.6	8.7	18.7	7	(1)

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

FLORIDA.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
10776	(2)	Broward	Siliceous limestone	(1)	(1)	(1)	(1)	(1)	17.3	6	61
10411	Delray (3 miles west)	Palm Beach	Shell limestone	(1)	(1)	(1)	50.9	0.8	(1)	(1)	52
10430	Boynton (near)	do	do	(1)	(1)	(1)	37.2	1.1	(1)	(1)	40
10431	Jupiter (15 miles west)	do	Siliceous limestone	(1)	(1)	(1)	12.5	3.2	14.7	5	43

GEORGIA

10398	Cartersville (3 miles east)	Bartow	Quartz schist	(1)	159	0.71	5.0	8.0	19.3	11	(1)
10399	Cartersville	do	Ferruginous sandstone	(1)	145	8.74	22.0	1.8	(1)	(1)	(1)
10400	Cass Station (2 miles north)	do	Sandstone	(1)	152	2.86	(1)	(1)	18.7	12	(1)
10192	Titusville	Brevard	Shell limestone	(1)	155	4.03	7.5	5.3	14.9	2	42
10645	Carrollton (4 miles north)	Carroll	Biotite gneiss	(1)	172	.35	4.7	8.5	17.7	7	(1)
10646	Carrollton	do	Granite gneiss	(1)	165	.62	4.5	8.9	18.7	5	(1)
10647	Carrollton (2 miles southwest)	do	do	(1)	169	.51	4.6	8.7	18.5	6	(1)
10648	Carrollton	do	do	(1)	168	.53	4.8	8.3	18.7	4	(1)
10654	Carrollton (7 miles northeast)	do	Biotite gneiss	(1)	166	.67	(1)	(1)	18.0	10	(1)
10655	Temple (4 miles east)	do	do	(1)	169	.56	7.7	5.2	17.0	5	(1)
10649	Carrollton (4 miles southeast)	do	Biotite schist	(1)	168	.51	5.7	7.0	18.9	8	(1)
10651	Mabry	do	Epidote hornblende schist	(1)	192	1.12	5.5	7.3	17.7	9	(1)
10653	Roopville	do	Mica schist	(1)	168	.75	(1)	(1)	16.7	5	(1)
10657	Bowdon (1 mile north)	do	Amphibolite	(1)	187	1.20	19.0	2.1	10.5	4	27
10417	Athens	Clarke	Biotite granite	(1)	165	.68	6.4	6.3	18.7	6	(1)
10422	Athens (4 miles west)	do	do	(1)	163	1.56	(1)	(1)	15.4	4	(1)
10423	Athens (4 miles from)	do	do	(1)	163	.58	4.4	9.1	17.8	9	(1)
10420	Athens	do	do	(1)	167	.47	5.9	6.8	18.7	4	(1)
10418	do	do	Granite gneiss	(1)	169	.76	7.5	5.3	17.7	6	(1)
10421	Athens (south of)	do	Biotite gneiss	(1)	167	.65	(1)	(1)	18.7	6	(1)
10377	Marietta (1½ miles south)	Cobb	do	(1)	170	.67	6.5	6.2	17.3	6	(1)
10378	Chattahoochee River	do	do	(1)	165	.26	5.1	7.8	18.6	8	(1)
10380	Lost Mountain Store	do	Hornblende gneiss	(1)	188	.93	(1)	(1)	13.3	4	(1)
10381	Southeast Kennesaw Mountain	do	Feldspathic gneiss	(1)	167	.73	(1)	(1)	18.7	6	(1)
10382	Marietta (4 miles northwest)	do	Biotite gneiss	(1)	169	.50	5.6	7.1	17.3	6	(1)
10387	Acworth (½ mile south)	do	do	(1)	175	.68	8.6	4.7	16.7	5	(1)
10388	Acworth (4 miles south)	do	do	(1)	174	.59	10.1	3.9	16.7	5	(1)
10389	Austell (¾ mile west)	do	Granite gneiss	(1)	163	.56	7.4	5.4	18.7	5	(1)

10393	Blackwell Station (1 mile north)	do	Hornblende gneiss	17,350	184	.42	4.9	8.2	17.3	7	(1)
10394	Kennesaw Mountain (north of)	do	do	(1)	180	1.05	(1)	(1)	18.0	7	(1)
10379	Smyrna (3½ miles west)	do	Magnetic quartzite	(1)	172	.84	(1)	(1)	18.0	7	(1)
10395	Kennesaw Station (4 miles southwest).	do	Amphibolite	(1)	191	.46	5.3	7.5	15.3	5	20
9869	Lela	Decatur	Siliceous shell limestone	(1)	125	2.51	22.2	1.8	19.3	5	20
10197	Beach Creek Bridge	Floyd	Calcareous shale	(1)	163	2.14	(1)	(1)	10.7	8	(1)
10199	Lavender Mountain	do	Sandstone	(1)	163	1.47	(1)	(1)	17.7	29	(1)
10198	Huffaker Station	do	Limestone	(1)	170	.22	3.6	11.1	16.0	6	42
10200	Rome (3 miles north)	do	Argillaceous limestone	(1)	168	.21	5.1	7.8	15.7	12	51
10202	Dozier Creek	do	Limestone	(1)	170	.44	5.1	7.8	15.7	4	36
10203	Pinson	do	do	(1)	169	.22	4.9	8.2	15.3	5	39
10211	Rome	do	Argillaceous limestone	(1)	167	.95	5.6	7.1	14.7	13	35
10221	Armuchee (1 mile southeast)	do	Crystalline limestone	(1)	168	.35	5.5	7.3	15.0	6	38
10222	do	do	Oolitic limestone	(1)	168	.20	4.2	9.5	16.0	8	35
10223	do	do	Limestone	(1)	168	1.12	3.8	10.5	16.7	8	61
10224	Armuchee (southeast of)	do	Argillaceous limestone	(1)	167	.59	4.0	10.0	17.3	16	40
9751	Atlanta (near)	Fulton	Biotite granite	(1)	168	.32	3.7	10.8	18.3	8	17
9761	do	do	Gneissoid granite	(1)	165	.34	4.7	8.5	18.0	7	15
9764	Atlanta	do	do	(1)	162	.85	(1)	(1)	19.3	8	24
9753	Atlanta (near)	do	do	(1)	168	.35	3.8	10.5	(1)	(1)	10
9752	do	do	Granite gneiss	(1)	165	.53	(1)	(1)	18.7	9	15
9754	do	do	Biotite gneiss	(1)	165	.94	8.4	4.8	17.3	7	21
9755	Atlanta	do	Mica gneiss	(1)	165	.38	3.0	13.3	18.7	10	19
9756	Atlanta (near)	do	Granite gneiss	(1)	165	.30	4.3	9.3	18.7	7	15
9757	do	do	do	(1)	165	1.01	(1)	(1)	17.2	7	24
9758	do	do	do	(1)	165	.41	4.1	9.8	19.3	13	20
9759	Atlanta	do	do	(1)	168	.30	3.8	10.5	18.3	13	20
9760	Atlanta (near)	do	do	(1)	165	.40	3.5	11.4	18.3	9	25
9762	do	do	Biotite gneiss	(1)	172	1.03	(1)	(1)	14.7	4	35
9763	do	do	Hornblende gneiss	(1)	184	.77	(1)	(1)	19.0	7	32
9765	do	do	Biotite gneiss	(1)	165	.18	5.0	8.0	18.7	6	29
9766	Atlanta	do	Granite gneiss	(1)	165	.36	3.4	11.8	18.0	9	22
9767	do	do	Hornblende biotite gneiss	(1)	175	.26	4.4	9.1	16.7	6	21
10396	Fairmount (½ mile south)	Gordon	Limestone	(1)	169	.27	5.3	7.5	14.7	5	31
10397	do	do	do	(1)	170	.08	4.1	9.8	15.3	6	35
10547	Lawrenceville	Gwinnett	Biotite hornblende schist	(1)	183	.60	(1)	(1)	15.7	5	(1)
10556	Lawrenceville (12 miles northeast)	do	Hornblende schist	(1)	196	.65	6.6	6.1	(1)	(1)	(1)
10553	Lawrenceville	do	Granite gneiss	(1)	159	.62	4.4	9.0	17.0	5	(1)
10564	Rosebud	do	Biotite gneiss	(1)	162	.69	5.6	7.1	18.9	6	(1)
10565	Snellville	do	do	(1)	162	.73	5.5	7.3	17.7	3	(1)
10554	Lawrenceville	do	Granite	(1)	165	.33	5.9	6.8	19.2	6	(1)
10555	Lawrenceville (1½ miles east)	do	do	(1)	162	.86	(1)	(1)	17.7	4	(1)
10557	Lawrenceville (6 miles southeast).	do	do	(1)	162	.72	4.9	8.2	18.4	6	(1)
10558	do	do	do	(1)	162	.61	4.6	8.7	18.0	5	(1)
10559	Grayson (2 miles east)	do	Biotite granite	(1)	158	.71	5.7	7.0	18.0	5	(1)
10560	McElvaney Shoals	do	Gneissoid granite	(1)	162	.71	5.2	7.7	18.2	4	(1)
10561	Grayson (southwest of)	do	do	(1)	162	.67	5.2	7.7	17.5	4	(1)
10562	Langley Quarry	do	Granite	(1)	162	.82	6.7	6.0	17.5	4	(1)

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

GEORGIA—Continued.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
10563	Grayson (3 miles southwest)	Gwinnett	Granite	(1)	162	0.78	5.5	7.3	18.3	6	(1)
10566	Snellville (2 miles southeast)	do	do	(1)	162	.73	4.0	10.0	18.3	6	(1)
10650	Lawrenceville (4 miles west)	do	Amphibolite	(1)	190	.32	3.4	11.8	18.0	13	12
10543	Pendergrass	Jackson	Olivine diabase	(1)	184	.09	3.6	11.1	19.0	16	22
10554	Talmo	do	Granite gneiss	(1)	161	1.13	7.6	5.2	(1)	5	(1)
10545	Holder Siding (near)	do	Hornblende gneiss	(1)	165	.48	4.0	10.0	18.3	7	(1)
10546	Jefferson (4 miles north)	do	Granite	(1)	163	.65	5.6	7.1	18.3	5	(1)
10656	Jefferson (3 miles east)	do	Hornblende schist	(1)	190	.04	(1)	(1)	17.0	4	(1)
10897	Robertsville (1½ miles northeast).	Jones	Argillaceous sandstone	(1)	105	19.80	12.2	3.2	(1)	(1)	(1)
9739	Montbrook	Levy	Chert	(1)	156	2.02	3.2	12.5	(1)	(1)	8
9740	do	do	do	(1)	156	2.74	3.5	11.4	(1)	(1)	78
10384	Upper Marietta	Milton	Granite gneiss	(1)	167	.56	6.6	6.1	18.0	8	(1)
10385	do	do	do	(1)	163	.59	6.9	5.8	18.7	6	(1)
10858	Columbus (4 miles north)	Muscogee	Hornblende gneiss	(1)	179	.25	4.5	8.9	16.7	5	(1)
10859	do	do	do	(1)	179	.45	5.0	8.0	16.7	5	(1)
10861	Fortson (4 miles south)	do	Biotite gneiss	(1)	167	.48	3.7	10.8	18.7	10	(1)
10862	Fortson (1 mile southwest)	do	do	(1)	164	.89	5.3	7.6	18.7	9	(1)
10863	Gentian (3½ miles northeast)	do	do	(1)	163	.50	3.6	11.1	18.7	9	(1)
10864	Columbus (8 miles north)	do	Granite gneiss	(1)	163	.83	4.3	9.3	18.7	7	(1)
10865	Gentian (3½ miles northeast)	do	Hornblende gneiss	(1)	163	.58	3.7	10.8	18.7	10	(1)
10881	Columbus (east of)	do	Granite gneiss	(1)	165	.36	3.9	10.2	18.7	7	(1)
10860	Fortson (2 miles southeast)	do	Biotite granite	(1)	168	.40	4.2	9.5	19.3	8	(1)
10776	(2)	(2)	Siliceous limestone	(1)	(1)	(1)	(1)	(1)	17.3	6	61

IDAHO.

10462	St. Anthony	Fremont	Basalt	(1)	159	4.17	7.2	5.6	16.7	4	(1)

ILLINOIS.

9750	Aurora	Kane	Smelter slag	(1)	221	0.17	2.2	18.2	(1)	(1)	(1)
10367	Kankakee	Kankakee	Dolomite	11,180	158	2.12	8.4	4.8	16.0	5	22
10208	Fox Township	Kendall	do	(1)	169	1.67	4.9	8.2	13.3	8	37
11133	Pontiac	Livingston	Argillaceous limestone	(1)	156	2.73	12.9	3.1	(1)	(1)	60
9827	Joliet	Will	Dolomite	8,130	168	1.18	4.9	8.2	15.1	8	39
10772	Aurora	do	Smelter slag	(1)	212	0.00	7.3	5.5	18.7	7	10

INDIANA.

9688	(2)	Clark	Argillaceous dolomite	(1)	150	5.23	10.3	3.9	0.0	3	53
11082	Brazil	Clay	Limestone	(1)	174	.66	4.3	9.3	17.3	11	48
11018	Milltown	Crawford	do	(1)	167	.56	3.3	12.1	16.3	11	34
11019	do	do	do	(1)	168	.66	3.6	11.1	15.0	7	31
11020	do	do	do	(1)	167	.60	3.5	11.4	15.3	11	28
11021	do	do	Argillaceous limestone	(1)	168	1.17	3.0	13.3	15.3	11	36
11022	do	do	Limestone	(1)	168	.37	4.5	8.9	16.7	6	35
11023	do	do	do	(1)	168	.61	4.4	9.1	15.7	7	13
11024	do	do	Pisolitic limestone	(1)	158	2.78	5.2	7.7	8.7	4	21
11025	do	do	Limestone	(1)	161	2.59	4.5	8.9	14.7	8	23
9859	St. Paul	Decatur	Argillaceous limestone	(1)	168	2.01	4.4	9.1	14.0	5	23
10114	do	do	do	(1)	168	1.01	4.0	10.0	13.3	5	32
11066	Schnellville	Dubois	Siliceous limestone	(1)	169	2.58	3.8	10.5	15.3	12	43
11183	Huntington	Huntington	Dolomite	25,420	163	2.10	4.1	9.7	14.0	7	95
9811	Vernon	Jennings	do	(1)	159	4.30	5.0	8.0	15.3	9	63
10834	do	do	Limestone	(1)	167	2.08	3.9	10.2	15.3	9	37
10847	do	do	Dolomite	(1)	149	6.90	8.1	4.9	12.0	4	22
10256	Bloomington (east of)	Monroe	Limestone	(1)	(1)	(1)	(1)	(1)	12.0	5	26
10257	Bloomington	do	Argillaceous limestone	(1)	(1)	(1)	(1)	(1)	14.6	5	50
10493	do	do	Limestone	(1)	185	1.03	4.8	8.3	14.7	7	22
9860	Greencastle	Putnam	do	(1)	168	.66	(1)	(1)	16.7	5	46
10519	Fillmore	do	Argillaceous limestone	(1)	159	2.22	(1)	(1)	11.2	6	22
10520	do	do	do	(1)	162	2.00	(1)	(1)	12.0	6	18
10727	Greencastle	do	Limestone	(1)	160	1.07	7.3	5.5	9.0	3	26
10020	Elberfeld	Warrick	do	(1)	159	3.81	4.5	8.9	15.3	9	40
9935	Bluffton	Wells	Dolomite	(1)	165	2.89	6.2	6.5	15.0	8	45
10693	(2)	(2)	Limestone	(1)	166	1.24	5.4	7.5	13.5	5	52
10694	(2)	(2)	Argillaceous limestone	(1)	148	8.75	8.9	4.5	0.0	3	49

KANSAS.

9599	Fort Scott (7 miles west of)	Bourbon	Limestone breccia	7,380	(1)	(1)	(1)	(1)	(1)	(1)	(1)
9780	Beloit	Mitchell	Argillaceous limestone	(1)	143	6.71	18.2	2.2	4.3	4	33

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
			KENTUCKY.								
					Pounds.	*Pounds.*					
10134	Lexington	Fayette	Argillaceous limestone	(1)	168	0.19	6.1	6.6	16.0	4	41
10136	do	do	do	(1)	168	.17	5.5	7.3	12.7	4	34
10451	Cerulean Springs (near)	Trigg	do	(1)	167	.45	4.7	8.5	14.2	6	37
9829	(2)	(2)	Limestone	(1)	165	1.31	(1)	(1)	13.7	6	40
9830	(2)	(2)	Argillaceous limestone	(1)	165	.82	(1)	(1)	15.5	10	44
			MAINE.								
10219	North Jay	Franklin	Granite	21,260	164	0.84	2.7	14.8	19.3	7	13
9997	Mount Desert	Hancock	do	19,780	165	.21	3.4	11.8	19.7	9	11
10233	do	do	do	19,220	162	.90	4.1	9.8	18.7	8	9
10234	do	do	do	24,700	160	.67	3.2	12.5	18.7	12	14
10988	Ship Harbor	do	do	28,650	165	.21	(1)	(1)	19.3	18	(1)
10989	do	do	do	26,500	163	.31	(1)	(1)	18.7	13	(1)
10990	do	do	do	32,450	164	.42	(1)	(1)	19.3	16	(1)
9781	St. George	Knox	do	18,780	(1)	(1)	(1)	(1)	(1)	12	(1)
9865	do	do	do	17,150	(1)	(1)	(1)	(1)	18.8	9	(1)
10019	Vinal Haven	do	Biotite granite	21,650	165	.25	3.1	12.9	19.3	14	28
9996	Long Cove	do	Granite	17,540	168	.23	3.3	12.1	19.2	10	30
10249	do	do	Biotite granite	22,500	165	.86	3.0	13.3	19.3	13	(1)
10250	do	do	Granite	22,330	166	.82	3.5	11.4	19.3	8	(1)
9706	Rockland	do	Marble	(1)	175	.40	4.3	9.3	17.0	4	47
			MARYLAND.								
10105	Frederick	Frederick	Limestone	(1)	(1)	(1)	3.0	13.3	16.0	5	(1)
10021	North Laurel	Howard	Amphibolite	(1)	200	0.46	3.5	11.4	17.7	8	32
10101	Dickerson	Montgomery	Diabase (trap)	(1)	(1)	(1)	1.4	28.6	18.5	21	(1)
11153	Halpine	do	Biotite granite	(1)	171	.42	3.1	12.9	18.7	13	(1)
11152	do	do	Epidote hornblende gneiss	(1)	198	.65	3.1	12.9	16.0	11	(1)

MASSACHUSETTS.

10016	Great Barrington	Berkshire	Marble	(1)	175	0.37	5.6	7.1	15.3	4	43
10288	Otis	do	Granite	18,260	166	.71	2.6	15.4	18.0	9	(1)
9770	Fall River	Bristol	Biotite gneiss	(1)	178	.27	2.7	14.8	18.2	17	24
11017	Acushnet	do	Chlorite gneiss	(1)	167	.44	2.4	16.6	19.0	17	(1)
10247	Seekonk	do	Feldspathic sandstone	(1)	167	.76	4.0	10.0	18.7	12	17
9649	Essex	Essex	Granite	19,580	165	.32	3.7	10.8	19.7	10	9
9650	do	do	do	18,125	165	.35	4.4	9.1	19.7	10	17
9651	do	do	do	22,285	165	.33	4.9	8.2	19.3	7	13
9652	do	do	do	18,780	165	.21	3.6	11.1	19.3	11	13
10089	West Rutland	Worcester	do	(1)	164	.16	2.9	13.8	18.6	12	19
10090	do	do	do	(1)	161	.79	6.7	6.0	18.0	7	18
10091	do	do	Biotite gneiss	(1)	168	.89	6.5	6.2	16.3	9	35
10935	Fayville	do	Granite gneiss	(1)	162	.75	3.0	13.3	18.7	11	(1)

MICHIGAN.

9855	Marquette	Marquette	Hornblende gneiss	(1)	184	0.62	(1)	(1)	19.3	22	30
9857	do	do	Amphibolite	(1)	181	.57	(1)	(1)	18.0	17	49
9856	do	do	Altered diabase	(1)	184	.66	(1)	(1)	18.7	25	32
9975	do	do	do	(1)	181	.52	2.1	19.1	19.3	12	27
9976	do	do	do	(1)	175	.42	3.8	10.5	16.0	13	55
9977	do	do	do	(1)	184	.60	3.1	12.9	18.3	11	97
9889	Monroe	Monroe	Dolomite	(1)	175	.64	3.6	11.1	17.0	16	30
9988	do	do	Argillaceous dolomite	11,750	165	3.03	4.2	9.5	(1)	5	22
9989	do	do	do	(1)	175	1.47	4.7	8.5	13.5	5	27
10041	do	do	Dolomite	(1)	172	1.80	3.6	11.1	17.0	17	18
9888	Sibley	Wayne	Limestone	(1)	159	2.82	12.4	3.2	15.3	6	44

MINNESOTA.

10485	Jasper	Rock	Quartzite	(1)	164	0.18	2.0	20.0	19.7	17	(1)

MISSISSIPPI.

10287	(2)	Holmes	Sandstone	(1)	144	4.70	7.8	5.1	18.0	8	(1)
10098	New Albany	Union	do	(1)	156	2.58	7.1	3.6	18.7	7	5

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

MISSOURI.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
10169	West Line	Cass	Limestone	(1)	156	1.09	11.5	3.5	13.5	5	24
10410	(2)	do	do	(1)	167	.53	5.6	7.2	14.7	6	31
10251	Hamburg	St. Charles	do	(1)	167	.63	5.2	7.7	12.3	4	37
10252	do	do	do	(1)	164	.90	7.3	5.5	10.7	3	34
10237	Sinclair	do	do	(1)	167	.73	4.0	10.0	16.0	7	25
10238	do	do	do	(1)	167	.75	5.1	7.9	15.3	5	22

NEBRASKA.

9905	Nehawka	Cass	Argillaceous limestone	(1)	168	0.75	4.7	8.5	16.0	6	42

NEW HAMPSHIRE.

9946	Fitzwilliam	Cheshire	Granite	26,100	165	0.32	3.7	10.8	17.7	9	15
9893	Marlboro	do	do	15,615	165	.36	6.7	6.0	17.3	8	18
9894	do	do	do	15,255	165	.52	5.7	7.0	19.3	6	23
9895	Fitzwilliam	do	do	10,825	165	.33	3.8	10.5	18.7	9	17
9994	Allenstown	Merrimack	do	18,110	165	.61	2.5	16.0	19.0	11	23

NEW JERSEY.

10795	Lambertville	Hunterdon	Diabase	(1)	183	0.46	2.8	14.3	18.7	19	49
9921	Mount Hope	Morris	Pyroxene granite	(1)	178	.44	2.4	16.7	18.3	9	18
10472	Boundbrook	Somerset	Altered diabase	(1)	184	.06	2.2	18.2	18.7	30	54

NEW MEXICO.

9768	Silver City	Grant	Altered granite porphyry	(1)	156	1.73	3.4	11.8	18.6	18	(1)

NEW YORK.

10097	Dolgeville	Herkimer	Dolomite	(1)	173	0.66	3.1	12.9	15.3	10	29
10236	Alexandria Bay	Jefferson	Biotite granite	(1)	(1)	(1)	(1)	(1)	18.7	12	(1)
10319	do	do	Granite	28,900	163	.49	2.8	14.3	18.0	10	12
10042	Albion	Orleans	Sandstone	20,000	(1)	(1)	3.4	11.8	17.3	9	(1)
10093	Rockland Lake	Rockland	Gabbroitic diabase	(1)	187	.19	3.0	13.3	19.0	13	29
10094	do	do	do	(1)	183	.27	3.6	11.1	19.0	12	67
10771	do	do	do	(1)	189	.28	3.0	13.3	18.7	19	37
10191	Hopkinton	St. Lawrence	Sandstone	(1)	157	2.02	2.8	14.3	18.0	12	7
11181	Tusten	Sullivan	Feldspathic sandstone	26,300	171	.64	3.3	12.1	15.3	14	(1)
11182	Collicoon	do	do	22,620	166	1.04	3.0	13.3	14.7	13	(1)
10909	Peekskill (south of)	Westchester	Hypersthene syenite	(1)	179	.62	3.5	11.4	17.0	9	(1)
11199	Yorktown	do	Granite	16,200	168	.77	5.8	6.9	18.0	5	(1)

NORTH CAROLINA.

10193	Cranberry	Avery	Hornblende gneiss	(1)	208	0.70	4.3	9.3	(1)	(1)	18
10194	do	do	do	(1)	192	.48	5.5	7.3	(1)	(1)	16
9858	Asheville	Buncombe	Biotite gneiss	(1)	168	.26	4.4	9.1	19.3	7	33
10972	do	do	do	(1)	168	1.35	2.7	14.8	18.0	10	(1)
10973	(2)	do	do	(1)	172	.67	3.7	11.4	18.0	13	(1)
9892	Granite Quarry	Rowan	Granite	21,125	(1)	(1)	4.6	8.7	(1)	(1)	(1)
10306	Granite Quarry (near)	do	do	34,860	164	.22	2.0	20.0	18.7	11	(1)
10405	Granite Quarry	do	do	(1)	(1)	(1)	(1)	(1)	(1)	10	(1)
10412	(2)	do	do	20,930	164	.51	2.8	14.3	19.3	9	(1)
10413	(2)	do	do	23,580	162	.43	3.3	12.1	19.0	7	(1)
10770	(2)	do	do	(1)	164	.43	5.2	7.7	19.3	10	(1)
9897	(2)	(2)	do	(1)	162	.55	13.8	2.9	(1)	(1)	14

OHIO.

9864	Lima	Allen	Dolomite	(1)	165	2.67	3.2	12.5	14.7	7	(1)
10025	do	do	Argillaceous limestone	(1)	168	2.77	3.5	11.4	14.7	12	31
10026	do	do	do	(1)	168	1.96	3.7	10.8	16.0	11	33
10027	do	do	do	(1)	168	2.26	3.6	11.1	15.0	11	34
10305	do	do	Limestone	(1)	169	1.80	4.2	9.5	16.0	6	27
9953	Middletown	Butler	Basic open-hearth slag	(1)	209	2.33	4.1	9.8	(1)	(1)	471
9954	do	do	do	(1)	190	2.74	20.4	1.7	(1)	(1)	191

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

OHIO—Continued.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
10516	Farmer	Clinton	Limestone	(1)	171	1.66	5.2	7.6	13.2	4	36
10517	do	do	Siliceous limestone	(1)	167	.49	6.6	6.1	13.7	5	45
10536	Marble Cliff	Franklin	Argillaceous limestone	(1)	(1)	(1)	(1)	(1)	15.2	6	27
9883	North Baltimore (Wood County, near).	Henry	Argillaceous dolomite	(1)	168	2.61	5.0	8.0	16.0	10	44
11198	Bellevue	Huron	Dolomite	(1)	156	4.89	4.9	8.2	6.0	5	52
9854	Ironton	Lawrence	Blast-furnace slag	(1)	181	.73	5.8	6.9	16.0	6	21
9890	Waterville	Lucas	Argillaceous dolomite	(1)	168	2.36	3.3	12.1	16.3	11	47
9983	do	do	Dolomite	(1)	168	2.04	2.8	14.3	16.3	14	38
11097	White House	do	Siliceous limestone	(1)	161	2.90	6.2	6.5	9.3	6	41
10537	Piqua	Miami	Dolomite	(1)	156	2.53	10.3	3.9	11.0	4	35
10538	do	do	do	(1)	178	.97	4.8	8.3	15.0	13	30
10532	Centerville	Montgomery	Argillaceous limestone	(1)	(1)	(1)	(1)	(1)	(1)	3	30
10533	do	do	do	(1)	(1)	(1)	(1)	(1)	(1)	5	24
10535	do	do	do	(1)	(1)	(1)	(1)	(1)	10.9	3	37
9945	Rocky Ridge	Ottawa	Dolomite	13,360	175	.41	5.4	7.4	12.0	9	37
9973	Limestone	do	do	(1)	162	(1)	5.5	7.3	12.0	7	38
10539	New Paris	Preble	do	(1)	167	1.12	3.4	11.8	16.2	6	37
10346	Luckey	Wood	do	(1)	162	3.68	7.3	5.5	12.0	6	38
9947	Bowling Green	do	do	(1)	165	1.38	7.5	5.3	12.2	6	33
9957	North Baltimore	do	do	(1)	168	2.08	4.0	10.0	14.3	14	50

PENNSYLVANIA.

9786	Granite	Adams	Gabbroitic diabase	23,435	(1)	(1)	(1)	(1)	15.2	14	(1)
10104	Birdsboro (near)	Berks	Diabase	(1)	(1)	(1)	1.7	23.5	18.7	13	(1)
10357	(2)	Delaware	Biotite gneiss	(1)	(1)	(1)	(1)	(1)	18.0	9	(1)
9773	Connellsville	Fayette	Siliceous limestone	(1)	168	0.46	2.8	14.3	17.7	13	85
10518	Montoursville	Lycoming	Argillaceous limestone	23,460	168	.10	6.6	6.1	16.2	6	27
10672	Jersey Shore	do	Siliceous limestone	(1)	166	.44	2.6	15.4	18.2	9	53
10137	South Bethlehem	Northampton	Blast-furnace slag	(1)	145	4.42	9.3	4.3	13.7	3	103
10429	Mount Carmel	Northumberland	Quartzite	(1)	163	.53	3.3	12.1	19.0	13	(1)
9812	Holmesburg	Philadelphia	Biotite gneiss	(1)	165	.58	(1)	(1)	19.0	7	(1)
11190	Shohola	Pike	Feldspathic sandstone	25,250	170	.63	3.2	12.5	16.7	12	(1)
10345	Confluence	Somerset	Calcareous sandstone	24,790	168	.34	3.6	11.1	16.7	7	(1)

RHODE ISLAND.

10171	Lincoln	Providence	Granite gneiss	(1)	170	0.17	3.9	10.3	18.7	12	20
10248	East Providence	do	Feldspathic sandstone	(1)	168	.59	3.6	11.1	18.0	12	16
10467	Westerly	Washington	Granite	(1)	161	.37	3.9	10.3	18.7	9	(1)

SOUTH CAROLINA.

10531	Rion	Fairfield	Biotite granite	(1)	165	0.59	4.4	9.1	18.3	8	(1)
10131	Greenville (17 miles from)	Greenville	Granite	(1)	165	.82	4.4	9.1	18.7	8	18
10129	Greenville	do	Hornblende gneiss	(1)	172	.68	8.0	5.0	17.0	6	40
10130	Beverly	Pickens	Biotite gneiss	(1)	166	.75	4.1	9.8	17.7	4	20

SOUTH DAKOTA.

10108	Dell Rapids	Minnehaha	Quartzite	(1)	165	0.41	2.8	14.3	19.3	17	5
10894	Sioux Falls	do	do	(1)	163	.27	1.4	28.6	19.3	17	(1)
10895	do	do	Olivine diabase	(1)	190	.37	2.7	14.8	18.7	18	16
10896	Rowena	do	Quartzite	(1)	164	.28	2.7	14.8	19.3	17	(1)

TENNESSEE.

9992	Maryville	Blount	Argillaceous limestone	(1)	168	0.40	3.8	10.5	16.7	6	49
9993	do	do	Limestone	(1)	168	.30	4.3	9.3	15.7	5	39
10292	New Tazewell	Claiborne	Siliceous limestone	(1)	171	1.84	4.2	9.5	13.3	8	31
10326	Harrigate (near)	do	Dolomite	(1)	174	.92	3.2	12.5	16.0	14	19
10327	Harrigate	do	do	(1)	171	1.83	3.6	11.1	13.3	7	21
10446	New Tazewell (near)	do	do	(1)	172	1.20	4.1	9.8	15.3	9	42
10581	New Tazewell	do	Siliceous dolomite	(1)	170	1.93	4.1	9.8	15.2	9	18
10483	Jamestown	Fentress	Sandstone	(1)	145	3.97	10.8	3.7	15.0	4	(1)
9887	Mascot	Knox	Dolomite	(1)	178	.20	4.1	9.8	16.0	11	49
10315	Madisonville	Monroe	Ferruginous sandstone	(1)	178	.41	4.0	10.0	17.3	8	(1)
10316	do	do	Siliceous limestone	(1)	169	.46	6.3	6.4	16.7	9	29
10317	do	do	Limestone	(1)	167	.77	8.3	4.8	16.7	9	33
10318	do	do	do	(1)	171	.33	4.2	9.5	17.3	8	26
10323	do	do	Crystalline limestone	(1)	168	.33	6.0	6.6	13.3	5	49
10414	(2)	do	Siliceous dolomite	(1)	174	1.36	3.3	12.1	15.7	18	29
9734	(2)	Pickett	Argillaceous dolomite	(1)	168	2.65	4.3	9.3	13.2	12	55

[1] Test not made.

[2] Exact locality not known.

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TEXAS.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
10044	(2)	Grayson	Clay limestone	(1)	134	12.80	(1)	(1)	0.0	2	(1)

VERMONT.

10848	Burlington	Chittenden	Siliceous dolomite	(1)	163	0.26	3.7	11.1	16.7	13	38
11191	Derby	Orleans	Siliceous limestone	(1)	171	.46	3.0	13.3	17.3	9	96
9673	Barre	Washington	Biotite granite	(1)	165	.37	2.8	14.3	19.0	9	19

VIRGINIA.

9928	(2)	Albemarle	Biotite gneiss	(1)	175	1.62	5.3	7.5	17.6	7	36
9927	(2)	do	Hornblende gneiss	(1)	193	.98	3.5	11.4	16.3	9	47
9926	(2)	do	Biotite gneiss	(1)	181	.57	5.1	7.8	18.7	7	63
10253	Charlottesville	do	Granite gneiss	(1)	171	.75	5.4	7.4	17.3	5	24
10172	Clifton Forge	Alleghany	Siliceous limestone	(1)	166	.48	2.5	16.0	17.6	10	48
9891	Lone Jack Station	Campbell	Quartzite schist	(1)	159	1.34	12.0	3.3	(1)	(1)	8
9904	do	do	Aplitic granite	(1)	165	.53	5.4	7.4	18.7	7	5
10344	Lynchburg	do	Quartzite	25,885	160	1.20	4.3	9.3	18.6	14	(1)
9819	Cliff View	Carroll	Hornblende schist	(1)	184	.71	4.4	9.1	18.3	14	31
9820	do	do	Altered hornblende gneiss	(1)	181	1.60	15.8	2.5	14.3	5	109
10115	Boston	Culpeper	Altered rhyolite	(1)	168	.84	4.7	8.5	19.0	5	(1)
9919	Warrenton	Fauquier	Amphibolite	(1)	187	.76	4.6	8.7	(1)	(1)	44
9920	do	do	do	(1)	181	2.44	5.9	6.7	(1)	(1)	120
9870	do	do	Epidote chlorite schist	(1)	187	1.46	3.6	11.1	(1)	(1)	43
10304	do	do	do	(1)	185	.63	3.5	11.4	14.7	11	(1)
10009	Hamilton (¾ mile east of)	Loudoun	Amphibolite	(1)	178	.49	3.9	10.3	17.3	10	17
10099	Luray	Page	Argillaceous limestone	(1)	167	.75	5.4	7.4	14.3	5	27
10298	Buckland	Prince William	Diabase	(1)	178	1.75	(1)	(1)	17.3	(1)	35
10930	Gate	Scott	Argillaceous limestone	(1)	168	.38	4.1	9.7	16.0	13	35
10780	Wise	Wise	Sandstone	(1)	158	2.10	4.5	8.8	18.7	10	(1)

WASHINGTON.

10239	Cook (3 miles north of)	Skamania	Basalt	(1)	177	0.92	2.6	15.4	18.3	24	14

WEST VIRGINIA.

10064	Martinsburg (south of)	Berkeley	Dolomite	(1)	178	0.31	3.6	11.1	16.3	10	29
10069	Butts Store	do	Feldspathic sandstone	(1)	140	3.45	7.2	5.6	18.7	(1)	8
10073	Hedgesville (west of)	do	do	(1)	165	.62	2.8	14.3	16.7	(1)	61
10087	Tomahawk (north of)	do	Sandstone	(1)	156	1.66	7.9	5.1	(1)	(1)	23
10062	Inwood (near)	do	do	(1)	144	3.19	16.6	2.4	19.3	2	17
10063	Ferrel ridge	do	Limestone	(1)	168	1.61	6.2	6.5	14.0	4	56
10065	Blairton (near)	do	Argillaceous limestone	(1)	168	.19	5.1	7.8	16.7	6	28
10066	Berkeley Station	do	Limestone	(1)	168	.27	6.3	6.4	16.0	4	34
10067	Jones Spring	do	Siliceous limestone	(1)	168	.31	4.4	9.1	17.3	9	44
10068	Bedington (east of)	do	Argillaceous limestone	(1)	172	.19	4.9	8.2	16.0	10	33
10070	Bunker Hill	do	Limestone	(1)	168	.24	5.1	7.8	16.0	4	34
10071	Nipetown	do	do	(1)	168	.43	4.9	8.2	16.0	3	32
10072	Spring Mills	do	do	(1)	168	.27	4.2	9.5	15.0	4	45
10074	Gerrardstown	do	Argillaceous limestone	(1)	172	.46	6.5	6.2	15.7	(1)	22
10075	Bedington (east of)	do	do	(1)	168	.32	5.6	7.1	(1)	(1)	29
10076	Van Clevesville (south of)	do	do	(1)	168	.36	5.0	8.0	17.0	9	(1)
10077	Darkesville	do	Limestone	(1)	168	.31	5.0	8.0	15.0	4	33
10078	Tomahawk	do	Siliceous limestone	(1)	168	.27	4.5	8.9	18.3	15	47
10079	Falling Water	do	Limestone	(1)	168	1.27	4.7	8.5	16.7	8	20
10080	Little Georgetown	do	Argillaceous limestone	(1)	175	.37	6.5	6.2	18.7	10	24
10081	Jones Spring	do	Crystalline limestone	(1)	168	.37	5.7	7.0	14.0	4	47
10082	Falling Water (near)	do	Limestone	(1)	168	.59	5.6	7.1	(1)	(1)	25
10083	Falling Water	do	Chert and limestone (mixed)	(1)	(1)	(1)	4.7	8.5	(1)	(1)	23
10084	Blairton	do	Limestone	(1)	168	.23	5.9	6.8	16.3	5	20
10085	Cumbo	do	do	(1)	172	.52	4.6	8.7	16.7	4	32
10086	Martinsburg (south of)	do	do	(1)	168	.56	5.8	6.9	18.0	5	39
10102	Martinsburg	do	do	(1)	(1)	(1)	5.2	7.7	16.7	6	(1)
10511	Scherr	Grant	Argillaceous limestone	(1)	166	.60	5.4	7.4	(1)	(1)	31
9925	Renick	Greenbrier	do	(1)	168	.66	3.8	10.5	16.3	8	41
9972	Fort Spring	do	Limestone	(1)	168	.24	4.1	9.8	15.7	9	57
10103	Kearneyville	Jefferson	do	(1)	(1)	(1)	2.7	14.8	14.0	6	(1)
9966	Greer	Monongalia	Argillaceous limestone	(1)	168	.73	4.7	8.5	15.7	8	40
9967	do	do	do	(1)	168	.59	4.7	8.5	15.7	9	63
9968	do	do	do	(1)	168	.73	4.8	8.3	14.0	9	37
9969	do	do	Siliceous limestone	(1)	168	.56	3.0	13.3	16.7	10	47
10348	Albright (near)	Preston	Sandstone	(1)	154	1.88	8.1	4.9	17.3	5	(1)
10349	Albright	do	Ferruginous sandstone	(1)	160	2.40	4.0	10.0	15.3	9	(1)
11130	Trap Hill District	Raleigh	Sandstone	(1)	154	3.69	3.9	10.3	16.6	9	(1)
10036	Spencer (near)	Roane	Feldspathic sandstone	(1)	156	3.52	12.3	3.3	8.7	4	32
10509	Davis	Tucker	Siliceous limestone	(1)	167	.05	3.7	10.8	14.3	10	30
10510	do	do	Argillaceous limestone	(1)	168	.12	5.0	8.0	16.3	6	37

[1] Test not made.

[2] Exact locality not known.

TABLE I.—*Results of physical tests of road-building rock from the United States, Canada, Porto Rico, and Cuba, from Jan. 1, 1916, to Jan. 1, 1917*—Con.

WISCONSIN.

Serial No.	Town or city.	County.	Name of material.	Crushing strength, pounds per square inch.	Weight per cubic foot.	Absorption per cubic foot.	Per cent of wear.	French coefficient of wear.	Hardness.	Toughness.	Cementing value.
					Pounds.	*Pounds.*					
9999	Berlin	Green Lake	Rhyolite	(1)	165	0.16	1.9	21.3	19.0	25	15
10168	Buffalo	Marquette	Altered syenite	(1)	167	.13	2.2	18.2	19.3	30	13
10014	Wauwatosa	Milwaukee	Argillaceous dolomite	(1)	168	2.11	3.7	2.8	14.7	8	(1)
11129	do	do	do	16,700	168	2.01	3.8	10.5	15.3	11	62
10986	Wells	Monroe	Calcareous sandstone	(1)	162	2.79	4.8	8.3	18.0	5	(1)
9970	Black Creek	Outagamie	Dolomite	(1)	178	.58	4.6	8.7	14.7	9	31
9971	do	do	do	(1)	178	.53	4.1	9.8	15.3	8	31
10022	Belgium	Ozaukee	Argillaceous dolomite	(1)	175	1.15	7.4	5.5	14.3	8	30
10159	Grand Rapids	Wood	Sandstone	(1)	153	1.91	3.3	12.1	18.3	5	3
10028	(2)	(2)	Dolomite	(1)	168	1.05	7.1	5.6	13.3	6	41

CANADA.

10017	Montreal	Province of Quebec	Nephelite syenite	(1)	156	0.60	2.2	18.2	18.7	18	22
10332	Wellesley Island	do	Biotite granite	(1)	165	.28	2.9	13.8	18.0	10	(1)
9746	Welland	Province of Ontario	Cherty limestone	(1)	165	.41	3.9	10.3	18.3	13	82

[1] Test not made.

[2] Exact locality not known.

TABLE II.—*Results of compression tests of rock complete to January 1, 1917.*

ARKANSAS.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
9828	Lamar	Johnson	Feldspathic sandstone	21,980
6331	Bald Knob	White	Sandstone	19,860

CONNECTICUT.

9791	Oneco	Windham	Biotite granite	16,635
11098	do	do	do	23,290
11099	do	do	Gneissoid granite	20,200

GEORGIA.

10381	Southeast side Kennesaw Mountain	Cobb	Feldspathic gneiss	18,500
10382	Marietta, 4 miles southwest of	do	Biotite gneiss	14,000
10389	Austell, ¾ mile west	do	Granite gneiss	12,890
10393	Blackwell Station, 1 mile north of	do	Hornblende gneiss	17,350

ILLINOIS.

4422	Embarras	Coles	Limestone	17,300
5509	Thornton	Cook	Dolomite	23,060
6053	do	do	do	16,880
8711	Hillside	do	Argillaceous dolomite	15,730
4660	Tunnell Hill	Johnson	Sandstone	19,150
7509	Reevesville	do	Argillaceous limestone	25,780
7510	do	do	do	28,400
4764	Kankakee	Kankakee	Dolomite	20,610
5550	do	do	do	17,710
6088	do	do	Argillaceous dolomite	20,830
6165	do	do	Dolomite	11,660
6865	do	do	do	13,500
7298	do	do	Argillaceous dolomite	25,850
7299	do	do	do	20,000
7300	do	do	do	19,800
7301	do	do	do	19,700
7302	do	do	Dolomite	17,050
7871	Lehigh	do	Argillaceous dolomite	16,700
10367	Kankakee	do	Dolomite	11,180
4421	Alton	Madison	Limestone	15,100
7422	Brookville	Ogle	Argillaceous dolomite	18,640
7423	do	do	do	18,180
5549	Anna	Union	Limestone	19,510
9827	Joliet	Will	Dolomite	8,130

INDIANA.

5534	Logansport	Cass	Limestone	20,350
4655	Greensburg	Decatur	Dolomite	17,960
4658	St. Paul	do	Limestone	18,400
4659	do	do	Dolomitic limestone	20,510
4690	Westport	do	do	20,000
5088	St. Paul	do	Limestone	19,800
11183	Huntington	Huntington	Dolomite	25,420
4197	Mitchell	Lawrence	Argillaceous dolomite	12,250
5027	Bedford	do	Limestone	6,900
5029	do	do	do	6,450
3368	Greencastle	Putnam	do	16,000
5737	Osgood	Ripley	do	14,470
4657	Wabash	Wabash	Dolomitic limestone	18,790

TABLE II.—*Results of compression tests of rock complete to Jan. 1, 1917*—Continued.

IOWA.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
5525	Cedar Rapids	Linn	Dolomitic limestone	19,950
5526	La Grande	Marshall	do	14,850

KANSAS.

9599	Fort Scott (7 miles west)	Bourbon	Limestone breccia	7,380

KENTUCKY.

5552	Princeton	Caldwell	Dolomitic limestone	23,860
7688	Cedar Bluff	do	Argillaceous limestone	25,720
5921	Limestone	Carter	Limestone	14,900
5922	Carter	do	Siliceous limestone	13,400

MAINE.

10219	North Jay	Franklin	Granite	21,260
7438	Swan's Island	Hancock	Biotite granite	18,400
9997	Somes Sound, Mount Desert Islands.	do	Granite	19,780
10233	do	do	do	19,220
10234	do	do	do	24,700
10988	Ship Harbor	do	do	28,650
10989	do	do	do	26,500
10990	do	do	do	32,450
8745	Vinal Haven	Knox	do	20,020
8768	St. George	do	do	22,800
8769	Vinal Haven	do	do	20,920
9781	St. George	do	do	18,780
9865	do	do	do	17,150
9996	Long Cove	do	do	17,540
9445	Vinal Haven	do	Biotite granite	21,220
10249	Long Cove	do	do	22,500
10250	do	do	Granite	22,330
10366	St. George	do	do	27,050
10019	Vinal Haven	do	Biotite granite	21,650
7439	Frankford	Waldo	do	20,600

MARYLAND.

5611	Mount Savage Junction	Allegany	Siliceous limestone	34,920
4884	Frederick	Frederick	Limestone	17,580
5694	Havre de Grace	Harford	Gneissoid granite	34,410
5695	do	do	Sericite gneiss	20,090
5696	do	do	Gneissoid granite	21,670
5697	do	do	Amphibolite	34,380
5698	do	do	Gneissoid granite	35,210
5699	do	do	do	22,190

MASSACHUSETTS.

10288	Otis	Berkshire	Granite	18,260
6891	Rockport	Essex	Biotite granite	22,370
6892	do	do	do	23,610
6893	do	do	do	22,670
6894	do	do	do	21,600
8796	do	do	do	23,830
9649	Gloucester	do	Granite	19,580
9650	do	do	do	18,130
9651	Rockport	do	do	22,390
9652	do	do	do	18,780
5671	Westfield	Hampden	Altered diabase	32,850

TABLE II.—*Results of compression tests of rock complete to Jan. 1, 1917*—Continued.

MASSACHUSETTS—Continued.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
8862	Westford	Middlesex	Granite	13,980
8874	do	do	do	17,000
8875	do	do	do	16,250
5988	West Auburn	Worcester	Mica gneiss	21,950

MICHIGAN.

9988	Monroe	Monroe	Argillaceous dolomite	11,750
9593	Calcite	Presque Isle	Limestone	10,300

MINNESOTA.

5524	Stockton	Winona	Argillaceous dolomite	16,000

MISSOURI.

6375	Rochefort	Boone	Limestone	13,900
10169	West Line	Cass	do	16,690
6377	Sweeney	Cooper	Argillaceous limestone	14,900

NEW YORK.

6457	[1]	Clinton	Plagioclase gneiss	18,500
6458	[1]	do	Pyroxene gneiss	20,500
8011	[1]	Dutchess	Dolomite	34,450
5544	Camelo	do	do	29,050
5872	Akron Junction	Erie	Cherty limestone	16,700
8577	Gloversville	Fulton	Biotite gneiss	14,585
4157	Alexandria Bay	Jefferson	Granite	21,600
8833	do	do	do	26,180
8902	do	do	do	14,150
9129	do	do	do	14,390
9130	do	do	Gneissoid granite	17,600
7437	do	do	Granite	27,200
10236	do	do	Biotite granite	28,130
10042	Albion	Orleans	Sandstone	29,000
8012	[1]	Rockland	Gabbroitic diabase	31,300
8013	[1]	do	Siliceous dolomite	22,200
10191	Hopkinton	St. Lawrence	Sandstone	35,240
11182	Callicoon	Sullivan	Feldspathic sandstone	22,620
11181	Tusten	do	do	26,300
11199	Yorktown	Westchester	Granite	16,200

NEW HAMPSHIRE.

9893	Marlboro	Cheshire	Granite	15,615
9894	do	do	do	15,250
9895	Fitzwilliam	do	do	10,830
9946	[1]	do	do	26,100
8872	Melford	Hillsboro	do	15,050
9010	do	do	Biotite granite	16,640
9011	do	do	do	14,870
9012	do	do	do	18,230
9031	Concord	Merrimack	Granite	16,600
9036	do	do	do	13,420
9037	do	do	do	13,900
8870	do	do	do	15,100
9994	Allentown	do	do	18,110

[1] Exact locality not known.

TABLE II.—*Results of compression tests of rock complete to Jan. 1, 1917*—Continued.

NORTH CAROLINA.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
8396	(1)	Forsythe	Granite	13,140
8397	(1)	do	Hypersthene gabbro	11,880
8682	Spencer Mountain	Gaston	Feldspathic quartzite	31,520
8881	Gastonia	do	Quartzite	17,100
8576	Mooresville	Iredell	Biotite granite	26,000
5373	(1)	McDowell	Sandstone	22,600
9038	Wilson	Wilson	Granite	16,070
5956	Stacey	Rockingham	Granite gneiss	23,220
5496	Sansbury	Rowan	Granite	33,750
9892	Granite Quarry	do	do	21,130
10306	Granite Quarry (near)	do	do	34,860
10412	(1)	do	do	20,930
10413	(1)	do	do	23,580
10770	(1)	do	do	17,800
11200	(1)	do	do	26,400
6071	Bostic	Rutherford	Biotite gneiss	16,100
5497	Mount Airy	Surry	Granite	18,400
7433	do	do	do	15,200
8901	do	do	do	5,100
9048	do	do	do	16,440
8419	Granita (near)	Wake	Biotite granite	14,160
3807	Wise	Warren	Granite	18,240
3808	do	do	do	18,560
5374	(1)	Yancey	Quartzite	12,900

OHIO.

4694	Osborne	Clarke	Dolomitic limestone	8,690
4695	Springfield	do	Dolomite	18,960
9282	Cleveland	Cuyahoga	Granite	31,790
9283	do	do	do	27,900
9284	do	do	do	24,790
9285	do	do	do	26,990
9459	do	do	do	24,900
4378	Sandusky	Erie	Limestone	19,400
5554	do	do	do	21,850
5753	Castalia	do	Dolomitic limestone	18,530
6055	do	do	Limestone	20,810
6056	Akron Junction	do	Cherty limestone	31,180
5505	Marble Cliff	Franklin	Limestone	16,750
5506	do	do	do	12,350
5630	Columbus	do	Ferruginous sandstone	21,800
4693	Patterson	Hardin	Dolomite	11,360
5553	Dunkirk	do	do	26,200
4707	Hillsboro	Highland	Cherty limestone	15,590
8347	Clarksfield	Huron	Calcareous sandstone	9,490
4656	Big Springs	Logan	Argillaceous limestone	16,380
6054	Vulcan	Lucas	Siliceous limestone	25,480
6057	Holland	do	Argillaceous limestone	19,430
8402	Toledo, 10 miles west of	do	Dolomite	11,600
10537	Piqua	Miami	do	9,810
10538	do	do	do	15,150
6052	White Rock	Ottawa	do	16,620
9945	Rocky Ridge	do	do	13,3 0
10539	New Paris	Preble	do	16,480
5556	Bloomville	Seneca	Limestone	20,250
5555	Middleport	Van Wert	Dolomite	25,200

OKLAHOMA.

3388	Granite	Greer	Granite	18,000

PENNSYLVANIA.

9786	Granite	Adams	Gabbroitic diabase	23,440
5602	Hyndman	Bedford	Impure limestone	24,150
5603	do	do	Siliceous limestone	21,860
5632	Birdsboro	Berks	Altered diabase	39,215

[1] Exact locality not known.

TABLE II.—*Results of compression tests of rock complete to Jan. 1, 1917*—Continued.

PENNSYLVANIA—Continued.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
8724	Juniata	Blair	Argillaceous limestone	15,480
8725	(1)	do	do	20,880
8625	Hazard	Carbon	Blast-furnace slag	9,000
7973	(1)	Chester	Pyroxene quartzite	31,800
7978	(1)	do	Mica schist	23,500
7979	(1)	do	do	23,900
5578	Salona	Clinton	Argillaceous limestone	18,710
7844	(1)	Dauphin	Siliceous limestone	26,500
8306	(1)	do	Limestone	8,510
8427	(1)	do	do	19,250
8465	(1)	do	Siliceous dolomite	9,640
8049	(1)	Elk	Ferruginous sandstone	14,150
5771	Indian Creek Station	Fayette	Calcareous sandstone	37,740
6097	Bidwell	do	Limestone	13,450
9347	Connellsville	do	do	26,050
5604	Water Street	Huntingdon	Feldspathic sandstone	22,330
5557	Walford	Lawrence	Limestone	27,500
10518	Montoursville	Lycoming	Argillaceous limestone	23,460
10672	Jersey Shore	do	Siliceous limestone	20,360
6153	Porter Township	do	Argillaceous limestone	28,580
6154	do	do	do	26,860
6155	do	do	do	18,610
6156	do	do	do	22,930
6157	do	do	Limestone	21,900
6158	do	do	do	14,160
7980	Port Allegheny	McKean	Feldspathic sandstone	9,680
8022	(1)	(1)	Ferruginous sandstone	12,130
8023	(1)	(1)	do	14,000
8024	(1)	(1)	do	12,480
11190	Shohola	Pike	Feldspathic sandstone	25,250
9812	Holmesburg	Philadelphia	Biotite gneiss	21,530
3243	McSpadden	Somerset	Sandstone	26,900
10345	Confluence	do	Calcareous sandstone	24,790
5830	Prompton	Wayne	Feldspathic sandstone	26,340
5605	Blairsville Intersection	Westmoreland	Siliceous limestone	32,560
7428	York	York	Dolomitic marble	27,400

RHODE ISLAND.

8867	Westerly	Washington	Granite	11,740
8868	do	do	do	20,300
8869	do	do	do	20,750

SOUTH CAROLINA.

8389	Williamstown	Anderson	Granite	12,990
5568	Rion	Fairfield	do	29,180
5586a	do	do	do	25,790
5586b	do	do	do	19,240
5586c	do	do	do	33,880
10531	do	do	Biotite granite	25,540

TENNESSEE.

5597	Quarry	Carter	Limestone	22,750
5502	Straw Plains	Jefferson	do	21,730
5504	do	do	do	28,340
5503	do	do	Dolomite	38,070
6533	Knoxville	Knox	Marble	17,970

VERMONT.

5543	East Wallingford	Rutland	Altered diabase	16,800
8853	Barre	Washington	Granite	19,560

[1] Exact locality not known.

TABLE II.—*Results of compression tests of rock complete to Jan. 1, 1917*—Continued.

VIRGINIA.

Serial No.	Locality.	County.	Name.	Crushing strength, pounds per square inch.
8804	Albert	Bedford	Granite gneiss	13,820
10344	Lynchburg	Campbell	Quartzite	25,885
6796	(1)	Dinwiddie	Granite	13,150
4900A	Broad Run	Fauquier	Quartz	28,400
4900B	do	do	Epidosite	28,000
5923	Strathmore	Fluvanna	Chlorite epidote schist	13,210
5678	Eggleston (near)	Giles	Dolomite	45,690
5924	Boscobel	Goochland	Granite gneiss	13,550
6615	Korah Station	Henrico	Biotite granite	20,300
5925	Greenway	Nelson	Feldspathic quartzite	16,500
5492	Nokesville	Prince William	Ferruginous sandstone	17,780
5920	Greenlee	Rockbridge	Dolomitic marble	36,900
5382	Bluff Water Station	Rockingham	Limestone	21,450
5385	do	do	do	40,850
5375	St. Paul	Russell	do	17,600
7217	Burkes Garden	Tazewell	Dolomitic sandstone	21,500

WEST VIRGINIA.

5365	Berkeley	Berkeley	Limestone	23,350
5917	Renick	Greenbrier	Crystalline limestone	21,300
5918	Frazier	do	Limestone	17,450
5919	Snow Place	do	do	13,550
7475	Green Spring, east of	Hampshire	Siliceous limestone	34,400
7476	do	do	Quartzite	15,050
6109	Spring Hill	Kanawha	Sandstone	12,400
9132	Fairmont	Marion	do	5,420
9133	do	do	do	5,720
9134	do	do	do	6,080
5610	Sturgisson	Monongalia	Siliceous limestone	22,440
5612	do	do	Limestone	17,910
5613	do	do	Argillaceous limestone	14,300
5614	do	do	Calcareous sandstone	29,840
5615	do	do	Impure limestone	19,650
5616	do	do	Argillaceous limestone	24,850
8447	Parkersburg	Wood	Feldspathic sandstone	11,910

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5523	Peebles	Fond du Lac	Dolomite	32,600
3448	Amberg	Marinette	Biotite granite	20,000
11129	Wauwatosa	Milwaukee	Argillaceous dolomite	45,310
8656	Lannon	Waukesha	Dolomite	23,020

[1] Exact locality not known.

TABLE III.—*Geographical distribution of rock samples tested to Jan. 1, 1917.*

Alabama	31	Kansas	13	New Jersey	75	Utah	13
Arizona	3	Kentucky	46	New Mexico	1	Vermont	35
Arkansas	17	Louisiana	7	New York	148	Virginia	424
California	101	Maine	86	North Carolina	149	Washington	213
Colorado	28	Maryland	121	Ohio	165	West Virginia	180
Connecticut	52	Massachusetts	192	Oklahoma	50	Wisconsin	149
Delaware	30	Michigan	95	Oregon	14	Wyoming	3
Florida	13	Minnesota	17	Pennsylvania	610	Canada	52
Georgia	256	Mississippi	13	Rhode Island	41	Porto Rico	12
Idaho	10	Missouri	39	South Carolina	30	Cuba	4
Illinois	128	Montana	4	South Dakota	15		
Indiana	179	Nebraska	12	Tennessee	77	Total	4,066
Iowa	23	New Hampshire	27	Texas	63		

By comparing the results of tests on a sample of rock with the limits as shown in the following table, a general idea of the types of road construction for which it is best suited may be obtained.

TABLE IV.—*General limiting test values for broken stone.*

Type of construction.	Traffic.[1]	Limiting values.		
		French coefficient of wear.	Toughness.	Hardness.
Water-bound macadam, plain or with dust palliative treatment.	Light	5 to 8	5 to 9	10 to 17
	Moderate	9 to 15	10 to 18	14 or over.
	Heavy	16 or over.	19 or over.	17 or over.
Macadam with bituminous carpet	Light to moderate	5 or over.	5 or over.	(2)
Bituminous macadam with seal coat	Moderate to heavy	7 or over.	10 or over.	.....
Bituminous concrete	Light to moderate	7 or over.	7 or over.	(2)
	Moderate to heavy	10 or over.	13 or over.	.....
Binder course for sheet asphalt or Topeka type.	Any	7 or over.	6 or over.	(2)
Portland cement concrete	Moderate to heavy	(3)	8 or over.	16 or over.
Stone paving block [4]	Any	(3)	9 or over.	16 or over.
Broken stone foundations	do	3 or over.	3 or over.	8 or over.
Cement concrete foundations	.....	.....	.....	.....

[1] Light traffic is assumed as less than 100 vehicles per day, moderate traffic between 100 and 250 vehicles, and heavy traffic over 250 vehicles per day.
[2] Numerous tests have shown that limits for hardness are unnecessary if the material possesses the required French coefficient of wear and toughness.
[3] Limits for French coefficient of wear are not at present considered necessary for this type of construction.
[4] Crushing strength, 20,000 pounds or over per square inch is sometimes required.

Cementing values should show over 25 in all cases if material is to be used in water-bound macadam construction.

In general, granites, gneisses, schists, sandstones, and quartzites should not be used in the wearing course of water-bound macadam roads. Shales and slates never should be used in this connection; therefore cementing value tests have been discontinued on these materials.

For further details and explanation of results in this table and also for tests on all materials to January 1, 1916, see U. S. Department of Agriculture Bulletin No. 370.

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